BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF HAWAII

---- In the Matter of the Application of --))) PUBLIC UTILITIES COMMISSION)) Instituting a Proceeding to) Investigate the Implementation) Of Feed-In Tariffs))	PUC Docket 2008-0273

LIFE OF THE LAND'S

COMMENTS RE RELIABILITY STANDARDS WORKING GROUP

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CERTIFICATE OF SERVICE

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(I) Reliability Standards Working Group

HECO proposes to establish a Reliability Standards Working Group ("WorkingGroup ") that would "serve as an open and transparent forum."[1] Attached to this parent group would be the Technical Support Group ("TechGroup") that would handle everything technical.

The TechGroup would be chaired by HECO and its members chosen by HECO. The TechGroup members would be (a) HECO; (b) HECO consultants; (c) HECO Energy Agreement co-signers; (d) the Electric Power Research Institute ("EPRI") (the utility trade group HECO belongs to); and (e) the Hawaii Natural Energy Institute ("HNEI") which is working the implement the HECO Energy Agreement.

The TechGroup would determine the reports that need to be written, would establish their scope and assumptions, and would review the draft and final reports. Sanitized summaries would be provided to the WorkingGroup.

Similarly to the Integrated Resource Planning ("IRP"), where the utility must listen to but does not have to respond to comments from IRP Advisory Group members – the TechGroup may listen to and ignore WorkingGroup suggestions.

WorkingGroup members could file dissenting opinions to the Commission that would be void of independent and TechGroup transmission studies. These dissents would not be data-based and would be filed and forgotten.

HECO stated that "information pertaining to proposed renewable energy projects such as their size, location, and operational characteristics might need

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[1] HECO Response to Commission, dated February 26, 2010 ("Responses"), page 4

to be protected as business confidential, out of respect to developers' competitive concerns." (HECO Response to SA/HSEA-SIR-7)

This information is available under protective seal to non-competitors in Commission dockets. For example, Life of the Land was privy to all submittals by all responders to HECO and MECO biofuels RFPs. However, it would be private to WorkingGroup non-competitors.

Thus the creation of the WorkingGroup appears to be to give legitimacy to a HECO-driven sub-group which would submit HECO arguments against everything non-HECO.

(II) Renewable Energy Penetration Levels

"The Hawaiian Electric Companies Have Some Of The World's Highest Levels Of Renewable Energy Penetration" (Exhibit 1, Letter from HECO to the Commission dated February 8, 2010. ("Exhibit 1") page 5)

The Statement is not true:

Electricity from Renewable Energy: Iceland 100%, La Desirade (France) 100%, Fiji 79.6%, Norway 76%, Samsoe (Denmark) 75%, Austria 72%, Pellworm (Germany) 66%, Reunion (France) 56%, Sweden 55%, Dominica 48%, Latvia 47%, Flores Island (Azores, Portugal) 42%, Samoa 38.5%, Sao Miguel Island (Azores, Portugal) 35%, Faeroe Islands (Denmark) 35%, St Vincent and the Grenadines 32.8%, California 31%, Slovenia 31%, Marie Galante Island (Guadeloupe, France) 30%, Corsica 30%, Miquelon (St Pierre and Miquelon, France) 29%, Portugal 29%, Hawaii Island 29%, Romania 28%, Finland 28%, Turkey 24%, **World 18%, State of Hawai`i 8%.**[2]

The Statement is not relevant:

It is the Level of Intermittency (LOS), the Level of Technological Diversity (LOTD), and the Level of Geographical Diversity (LOGD) that are relevant.

20% from one central station wind or solar system is less desirable than

(a) 100% from one baseload renewable system; OR
(b) 50% from 50 small renewable energy facilities (of one type only); OR
(c) 25% from multiple types (wind, solar electric, solar thermal); OR
(d) 20% from one central station where supply mirrors the demand

* The confusion between (a) "renewable energy" and (b) "intermittent energy" occurs throughout the paper.

* The confusion between (a) the reliability of large central station generators versus (b) small dispersed generators versus (c) hybrids systems with large central station and small dispersed generators also occurs throughout the paper.

(III) Renewable Energy Penetration Levels at the Distribution Level

By island, renewable energy penetration levels at the distribution level vary greatly, ranging from over 43% on Lanai to less than 3% on Maui.[3]

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[2] Sources: United Nations; US Energy Information Administration; European Environmental Agency; Renewable Energy on Small Islands; The Guardian; Highlands and Islands Enterprise Network; Renewable Energy Policy Network for the 21st Century

By distribution circuit, renewable energy penetration levels at the distribution level vary greatly, from over 60% to 0%.[4]

Even though renewable energy penetration levels exceed 60% for some circuits and 40% for some grids, HECO does not want circuits to exceed 15% based on existing and planned renewable energy projects. That is, if a circuit is at 0% but there is a plan in the intermediate future to bring it up to 15%, there is "no room" for a net metered system to be installed today. This argument lacks credibility and is counter-productive to getting off imported fuels.

(IV) Reliability Issues

"The term *transmission constraint* may refer either to a piece of equipment that limits electricity flows in physical terms, or to an operational limit imposed to protect reliability. ... Congestion also occurs in areas where the grid is managed by individual integrated utilities rather than by regional grid operators; however, since transmission, generation and redispatch costs are less visible in these areas, the costs of congestion are not as readily identifiable."[5]

"Wind curtailment initiatives appear to be increasing, perhaps in part because of the rapid growth of wind power, and the lack of development of supporting transmission infrastructure to keep up. To date, with the exception of isolated systems such as Hawaii, it appears that wind curtailment occurs for two primary reasons: 1) lack of available transmission during a particular time to incorporate some or all of the wind generation; or 2) high wind generation at

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[3] Distribution Level Penetration % of Peak System Load: Lanai (43.7%), Molokai (5%), Hawaii (4.7%), Oahu (3.3%), Maui (2.9%) Source: Table 1, Exhibit 1, page 12

[4] "HECO does have several distribution feeders with penetrations approaching 15% penetration) (Exhibit 1, page 2) "The HELCO system also has individual circuits with up to 62% penetration." (Exhibit 1, page 15) "Lanai has three 12 kV distribution circuits serving the entire island load. One circuit has 1,207 kW of Photovoltaic (PV) and 830 kW of generation (Combined Heat and Power [CHP])." (Exhibit 1, page 27)

[5] **National Electric Transmission Congestion Study (2006) US DOE www.docstoc.com/docs/19740453/Congestion_Study_2006-9MB**

times of minimum or low load, as wind generation in some regions may have production characteristics nearly opposite of electricity demand, and the energy cannot be exported to other balancing areas because of lack of transmission. As wind penetration levels in most balancing areas in the United States are still quite low, the primary cause of most wind curtailments can be attributed to a lack of transmission capacity."[6]

The report Quantifying PV Power Output Variability Thomas E. Hoff and Richard Perez notes that "There is a growing concern about the effects of photovoltaic (PV) power output variability on utility grid stability. High levels of minute-by-minute output variability during partly cloudy conditions reported at some central station PV facilities have created an awareness of this issue. Some industry professionals believe that this issue could constrain the penetration of grid-connected PV. These and other concerns prompted the US Department of Energy to hold a workshop on "High Penetration of Photovoltaic (PV) Systems into the Distribution Grid" in February 2009. Many participants identified PV output variability as a top research priority. There has been a fair amount of work devoted to understanding the variability associated with the solar resource for a single location. ...Minimal work, however, has been devoted to understanding the effect on irradiance variability of combining multiple locations."[7]

The Report goes onto say that as you increase the dispersion and number of small systems there is a "smoothing effect" on the variability of the "fleet". To Illustrate this point the report compares data from a 5MWDC PV plant with modeled data on 1,000 5kW distributed PV systems and finds that while the PV plant shows 50- 60% fluctuations in output over a 1 minute time interval the

[6] **Wind Energy Curtailment Case Studies: May 2008 — May 2009** By S. Fink, C. Mudd, K. Porter, and B. Morgenstern. *Exeter Associates, Inc. Columbia, Marylan.* www.nrel.gov/docs/fy10osti/46716.pdf

[7] Quantifying PV Power Output Variability by *Thomas E. Hoff and Richard Perez. Clean Power Research. 2009* www.cleanpower.com/research/capacityvaluation/QuantifyingPVPowerOutputVariability.pdf

same amount of distributed power would have less than 3% variation over the same time interval.[8]

The report also addresses wind vs solar issue eloquently "an underlying assumption that some sort of mitigation effort is required to protect against short-term variability because PV, like wind, is powered by a non- controllable renewable resource. It is important to recognize, however, that there are fundamental differences between PV and wind. The most important difference is that PV power is proportional to irradiance while wind power varies as the cube of the wind speed. For example, if both irradiance and wind speed double over a very short interval of time, PV output would increase by 100 percent while wind generation would increase by 700 percent. Whatever the cause, the general perception is that this issue could adversely impact the adoption of grid-connected PV."[9]

"Currently the commercially-available simulation tools do not incorporate PV system models or solar resource information. There is also a need to be able to evaluate the impacts of PV and loads as an integrated system."[10]

"**Synergy Between Renewable Sources** ...Hydropower and solar power are also intermittent resources, due to their dependence meteorological conditions. However, the variables affecting these three different forms of renewable resource are independent of each other and do not necessarily occur at the same time. They can therefore be partially mutually compensated. Analyzing 50 years of data on wind velocity in Portugal shows high variation relative to the average year, with a consequent impact on the yearly variation curve. The wind velocity and the water inflow have average variations through the year which

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[8] Id. Page 40

[9] Id. pages 12-13

[10] High Penetration of Photovoltaic (PV) Systems into the Distribution Grid. Workshop Report, p. 6. *February 24-25, 2009 Ontario, CA Sponsored by:* U.S. Department of Energy Office of Energy Efficiency & Renewable Energy Solar Energy Technologies Program Systems Integration Subprogram DOE/GO-102009-2848 June 2009. http://www1.eere.energy.gov/solar/pdfs/pv_grid_penetration.pdf

follow a similar pattern and their two curves have a high correlation (0.98). The solar radiation varies almost inversely, relatively to the wind velocity and the water flow (correlations of -0.7 and -0.66, respectively). That observation indicates that the complementary relationship between solar energy and wind/hydro is favourable. Solar energy can therefore be used to smooth seasonal variations of wind power."[11]

(V) **Summary**

Working on reliability is very important. However, HECO's proposal is driven by HECO's need to dominate and not by the facts.

(a) Reliability Analysis requires independent analysis not driven by one energy producer at the expense of another. A Hawai`i Island Independent System Operator ("HIISO") would be a starting point.

(b) HECO's proposed Big Wind would be by far the biggest single central station renewable system in the state, and would exacerbate reliability concerns, while zillons of small dispersed systems would have the opposite effect.

(c) Long range planning should look at the system in a holistic fashion. Integrated Resource Planning / Clean Energy Scenario Planning is a reasonable vehicle. To examine reliability of one very small piece of the puzzle and ignoring other pieces, and to do it outside of the planning process is absurd.

March 15, 2010, Honolulu Hawai`i

Henry Q Curtis

HENRY Q CURTIS
VICE PRESIDENT FOR CONSUMER ISSUES

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[11] **Integrating Wind Power in Portugal** by Pedro S. Moura. Renewable Energy World Magazine. Volume 12 Issue 6, November/December 2009. www.renewableenergyworld.com/rea/news/article/2009/12/integrating-wind-power-in-portugal

Certificate of Service

I hereby certify that I have this date served a copy by hand delivery of the foregoing LIFE OF THE LAND'S FIT COMMENTS RE RELIABILITY STANDARDS WORKING GROUP in PUC Docket Number 2008-0273, upon the following parties. I have hand delivered the original and 8 copies to the PUC, and two copies to the Consumer Advocate and e-mailed a copy to each other party listed below.

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